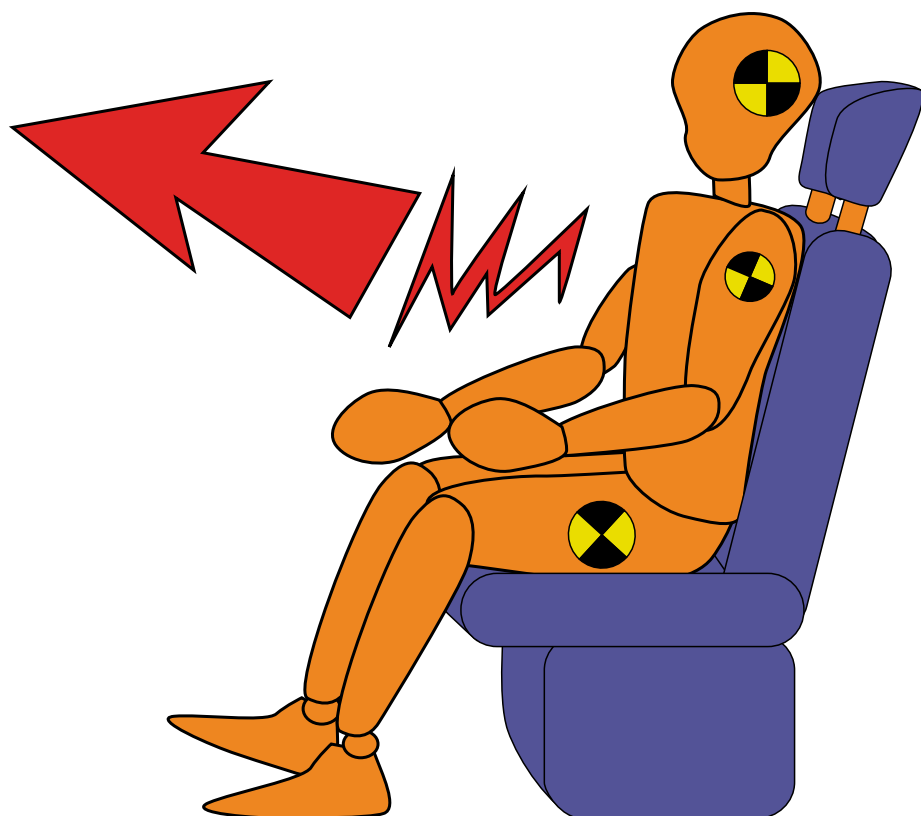


BUCKLE UP!

Explores the theme of seatbelts and other car safety features.



Year 7

Subject

Physical Science

Covers

SU, SHE & SIS requirements of the Australian curriculum

in2science.org.au

Meet a Mentor

Sam is studying Civil Engineering at the University of Ballarat

What or who made you think that you would enjoy the course that you are studying?

When I was young my Dad had a series of books about a soldier during the Napoleonic wars...I loved them, but I particularly liked the references to the engineers and the ways they contributed to the war effort by building and repairing roads and bridges and reconstructing buildings. It took my imagination and made me want to do the same.

How do you use your engineering studies in everyday life?

I can't go anywhere without noticing bridges, pipelines and new buildings. It's really satisfying understanding why they're built the way they are and to appreciate how important but complicated it is to build large, strong and stable structures.

What has been the highlight of In2science for you?

My first placement was in a year 10 science class. Seeing what the kids could create out of Lego was pretty impressive...race cars, working guitars, forklifts...their imagination was fantastic and the project suited me perfectly. I got to know most of the students really well and I guess I'll never know for certain but I hope that I made a difference to their lives and helped them see that they could become engineers as well.



Curriculum Links

SHS – Use and influence of science

Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (ACSHE120).

- Relating regulations about wearing seatbelts or safety helmets to knowledge of forces and motion

SIC – Planning and conducting

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (ACSIS125).

In fair tests, measure and control variables and select equipment to collect data with accuracy appropriate to the task (ACSIS126).

- Recognising the differences between controlled, dependent and independent variables
- Using specialised equipment to increase the accuracy of measurement within an investigation

Possible experiments

Egg Drop

Students design and test a system that will protect a fresh egg from a drop using everyday materials.

Tofu Splat!

Drop 2cm cubes of tofu from different heights (eg: 50, 100, 150cm) and measure the diameter of the resulting splat. Students design and test a method of protecting tofu – link to bike helmets.

Egg Cup

Run with an egg in a cup. Stop suddenly; demonstrates inertia (and what happens to the egg). Have students design and test an egg restraint – link to seatbelts in cars.

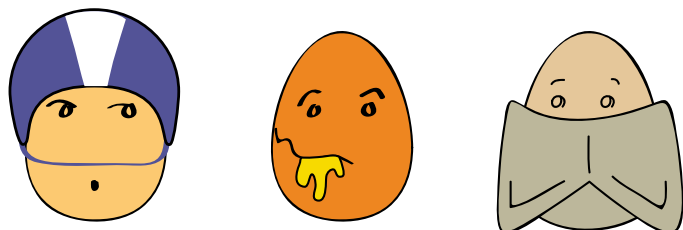
Belt Up!

Toy Car/skateboard with playdoh person. Car pushed down ramp and what happens to person recorded. Test with no 'seatbelt' then with a range of thin/thick restraints attached in different ways.

Further resources

www.latrobe.edu.au/in2science/resources

australiancurriculum.edu.au/Science/Curriculum/F-10



Lesson Idea

Aim

To investigate the forces on a person in a car and the effectiveness of seatbelts.

Lesson Outline

- Watch clip of seatbelt advert (youtube.com/watch?v=HFX9kQweHZ4 15 min montage of seatbelt adverts – choose to suit)
- Discuss forces and what happens if forces are applied to the human body
- Draw and label force diagram of body in car when accelerating/decelerating
- Have students suggest safety features (helmets, knee pads, air bags, seat belts etc)
- Demo hammering flathead nail/bed of nails – relate force/area/pressure, relate to impact
- Explain concept of inertia (eg: books on wheelie chair demo youtube.com/watch?v=T1ux9D7-038)
- Design and test egg/toy seatbelt (see 'Possible Experiments' above)
- Produce safety poster/advert advising students to wear a seatbelt

Science Inquiry Skills

Identify variables: independent variable (eg: height of tofu), dependent variable (eg: diameter of tofu splat), control variables (size of cube etc).

Scaffolding Inquiry with Questions

What do you want to know?

How will you test your theory?

What do you think will happen?

How will you make sure it is a fair test?

Why do you think that?

Curriculum Links

Physical Science Year 7

Change to an object's motion is caused by unbalanced forces acting on the object. (ACSSU117)

- Investigating the effects of applying different forces to familiar objects
- Investigating common situations where forces are balanced, such as stationary objects, and unbalanced, such as falling objects

Mentor Support

How your In2science mentor can assist:

Whole class

- Mentors describe how they use SIS in their own studies
- Mentor demo: 'Bed of Nails'

Small Groups

- Question students about their hypotheses and the reasoning behind them

One-on-one

- Help individuals plan and carry out experiments.
- Emphasise how to make sure the test is fair.